



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,910	05/18/2006	Toshiaki Masuda	MMY-US041113	8921
22919 7590 06/23/2009 GLOBAL IP COUNSELORS, LLP 1233 20TH STREET, NW, SUITE 700 WASHINGTON, DC 20036-2680				
EXAMINER				
LENIHAN, JEFFREY S				
ART UNIT		PAPER NUMBER		
1796				
MAIL DATE		DELIVERY MODE		
06/23/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/595,910

**Applicant(s)**

MASUDA ET AL.

**Examiner**

Jeffrey Lenihan

**Art Unit**

1796

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 and 35-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19, 21-29, 32, 33 and 35-37 is/are rejected.
- 7) ☒ Claim(s) 20, 30 and 31 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date See Continuation Sheet
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :06/01/2006, 08/29/2006,11/02/2007,11/20/2008,03/06/2009.

## **DETAILED ACTION**

### ***Drawings***

1. The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81(c). No new matter may be introduced in the required drawing. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). The examiner notes that the file for the instant application does not contain a copy of the drawings, nor is it indicated on the Notice of DO/EO acceptance mailed on 3/14/2007 that a copy of the drawings was received.

### ***Specification***

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of **50 to 150 words** (emphasis added). It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The abstract of the disclosure is objected to because of undue length. Correction is required. See MPEP § 608.01(b).

***Claim Objections***

4. Claims 20, 30, and 31 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In independent claim 1, the examiner takes the position that it is unclear whether the limitation "fixed inside a hot gas flow" is intended to describe the gas-introducing tube or the dispersion nozzle. This limitation is inherited by dependent claims 2 and 4-10.

7. Regarding claim 2 the phrase "the gas introducing tube and/or collision plate is comprised of" indicates that the following limitations are intended to be components which the tube/plate are made of; the examiner takes the position that is unclear how an article such as a tube and/or plate may be "comprised of an overheating function."

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 3, 11, 13, 14, 16, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al, WO 03/099955, in view of Edgren et al, US4397799. The examiner notes that Masuda et al, EP1508604 (Masuda '604), will be utilized throughout this Office Action as an equivalent English translation of WO 03/099955.

11. Masuda '604 discloses thermo-expansive microcapsules comprising a shell prepared from a mixture of monomers and a blowing agent encapsulated therein (abstract) (claim 11). Said shell is disclosed to comprise 40 to 95% by weight of a nitrile monomer (¶0008, 0011), 5 to 60% by weight of an ethylenically unsaturated monomer containing a carboxylic acid group (¶0008, 0012-0013), and 0.01 to % by weight of a

monomer containing two double bonds (claim 17) ( $\text{¶}$ 0008, 0014-0015). Said blowing agent may be a hydrofluoroether such as  $\text{C}_4\text{F}_9\text{OC}_2\text{H}_5$  (claim 16) ( $\text{¶}$ 0022).

12. Edgren teaches a method for drying and expanding microspheres using an apparatus wherein a dispersion of unexpanded microspheres in an inert liquid is atomized and then brought into contact with a warm, inert gas flowing in a tubular chamber (Column 2, lines 13-18). (Column 1, lines 21-23). Said unexpanded beads typically have a diameter of 1 to 1000  $\mu\text{m}$  (claim 3) (Column 1, lines 21-23). Said dispersion may be atomized by passing through one or more nozzles (Column 2, lines 48-51) which are outside the heated gas flow (claim 3) (Figure 1). Expansion is performed at temperatures up to 180  $^{\circ}\text{C}$  (claims 3, 11) (Column 2, lines 34-36). Edgren teaches that uniformly expanded microspheres may be obtained via the use of this apparatus (Column 2, lines 8-12).

13. Both Masuda '604 and Edgren are directed towards the production of expandable/expanded microspheres. The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art to modify the thermo-expansive microcapsules of Masuda '604 by drying and expanding the microcapsules using the apparatus disclosed by Edgren, for the purpose of obtaining uniformly expanded microcapsules.

14. Masuda '604 and Edgren are silent regarding ratios of aggregated microspheres (claim 11), true specific gravity (claim 11), coefficient of variation (claim 13), re-expansion temperature (claim 14), a damage sealing function (claim 19), or a pressure supply function (claim 19); however, the examiner takes the position that said limitations

would be inherently met by the thermo-expansive microcapsules rendered obvious by the prior art. As discussed above, the microcapsules of Masuda '604 are prepared using the materials as the claimed microspheres. The examiner further notes that the process of Edgren involves the dispersion of unexpanded microspheres into a gas in the atomization step; followed by contacting the microspheres with a heated gas flow to initiate expansion. As the combination of Masuda '604 and Edgren render obvious microcapsules which have a similar composition to the claimed microspheres and are expanded by a similar method to that used by applicant, the examiner takes the position that one of ordinary skill in the art would reasonably expect that the properties of the microcapsules rendered obvious by the prior art would not be materially different from those of the claimed microspheres. Applicant is therefore required to provide factual evidence demonstrating that the claimed properties would not be inherently present in the microcapsules rendered obvious by the prior art (claims 11, 13, 14, 19).

15. Claims 12, 15, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Masuda et al, WO 03/099955 and Edgren et al, US4397799, as applied to claims 11 and 16 above, and further in view of Nakajima et al, US6225361.

16. Masuda '604 and Edgren are silent regarding the addition of a particulate filler.

17. Nakajima discloses the surface modification of expandable microspheres through the attachment of colloidal calcium carbonate (abstract, Column 2, lines 25-34) having a particle diameter not more than 0.2  $\mu\text{m}$  (claims 12, 18) (Column 4, lines 3-4). Nakajima



further teaches the treatment of said microspheres with dispersing agents such as organic compounds dispersed in tall oil (claim 15) (Column 4, lines 12-35). Microspheres treated in this manner are characterized by improved properties, such as a reduction in scattering of the beads during handling (Column 6, lines 45-46).

18. Masuda '604, Edgren, and Nakajima are directed towards the field of expandable resins/microcapsules. The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the thermo-expansive microcapsules rendered obvious by the combination of Masuda '604 and Edgren by modification with colloidal calcium carbonate and organic dispersing agents for the purpose of obtaining the improved handling properties discussed above, as taught by Nakajima.

19. Claims 21, 23, 25-27, 29, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al, WO 03/099955, in view of Wu et al, US5834526.

20. Masuda '604 discloses thermo-expansive microcapsules comprising a shell prepared from a mixture of monomers and a blowing agent encapsulated therein (claim 21) (abstract). Said shell is disclosed to comprise 40 to 95% by weight of a nitrile monomer ( $\text{¶}0008, 0011$ ), 5 to 60% by weight of an ethylenically unsaturated monomer containing a carboxylic acid group ( $\text{¶}0008, 0012\text{-}0013$ ), and 0.01 to % by weight of a monomer containing two double bonds (claims 27, 32) ( $\text{¶}0008, 0014\text{-}0015$ ). Said blowing agent may be a hydrofluoroether such as  $\text{C}_4\text{F}_9\text{OC}_2\text{H}_5$  (claims 25, 32) ( $\text{¶}0022$ ).

21. Masuda '604 is silent regarding the average particle size of the thermo-expansive microcapsules.

22. Wu discloses the production of expandable hollow particles comprising a thermoplastic shell comprising an encapsulated volatile fluorinated fluid (Column 2, lines 15-19) which are useful in applications such as insulation and packaging (Column 6, lines 1-3). Said shell may be produced from monomers such as (meth)acrylonitriles and (meth)acrylic acid (Column 2, lines 40-62). Said volatile fluorinated fluid preferably comprises a partially fluorinated ether (Column 3, lines 36-39). Said particles have an average diameter of 1 to 200  $\mu\text{m}$  (claims 21, 32) (Column 2, lines 28-31).

23. Both Masuda '604 and Wu disclose the production of expandable microcapsules comprising shells produced from nitrile monomers and carboxylic acid-containing monomers and a fluorinated ether-containing blowing agent. The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the thermo-expansive microcapsule of Masuda '604 by preparing particles having an average diameter of 1 to 100  $\mu\text{m}$  for the purpose of preparing microcapsules suitable for use in insulation applications, as taught by Wu.

24. Both Masuda '604 and Wu are silent regarding ratios of expansion coefficient (claim 21), aggregated microspheres (claims 21, 23), true specific gravity (claim 21, 23), coefficient of variation (claim 26), a damage sealing function (claim 29), or a pressure supply function (claim 29); however, the examiner takes the position that said limitations would be inherently met by the thermo-expansive microcapsules rendered obvious by

the prior art. As discussed above, the microcapsules of Masuda '604 are prepared using the materials as the claimed microspheres. As the combination of Masuda '604 and Wu render obvious microcapsules which have a similar composition and size compared to the claimed microspheres, the examiner takes the position that one of ordinary skill in the art would reasonably expect that the properties of the microcapsules rendered obvious by the prior art would not be materially different from those of the claimed microspheres. Applicant is therefore required to provide factual evidence demonstrating that the claimed properties would not be inherently present in the microcapsules rendered obvious by the prior art (claims 21, 23, 26, 29).

25. Claims 22, 24, 28, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Masuda et al, WO 03/099955, and Wu et al, US5834526, as applied to claims 21, 25, and 32 above, and further in view of Nakajima et al, US6225361.

26. Both Masuda '604 and Wu are silent regarding the attachment of an anti-blocking agent to the thermo-expansive microcapsules.

27. The disclosure of Nakajima is discussed previously in this Office Action.

28. Masuda '604, Wu, and Nakajima are directed towards the field of expandable resins/microcapsules. The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the thermo-expansive microcapsules rendered obvious by the combination of Masuda '604 and Wu by modification with calcium carbonate and organic dispersing

agents for the purpose of obtaining the improved handling properties discussed above, as taught by Nakajima.

29. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al, WO 03/099955.

30. Masuda '604 discloses thermo-expansive microcapsules which comprise a shell produced from a mixture of monomers and a blowing agent encapsulated therein (abstract), wherein said thermo-expansive microcapsules are produced by a suspension polymerization process comprising the steps of dispersing a mixture of polymerizable monomers and a blowing agent in an aqueous dispersion medium containing a dispersant, followed by polymerization of said monomers in the presence of said blowing agent (claim 35) (¶0023). As discussed previously in this Action, said shell comprises 40 to 95% by weight of a nitrile monomer and 5 to 60% by weight of an ethylenically unsaturated monomer containing a carboxylic acid group (claim 35), and said blowing agent may be  $C_4F_9OC_2H_5$  (claim 35).

31. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al, WO 03/099955 as applied to claim 35 above, and further in view of Nakajima et al, US6225361.

32. Masuda '604 is silent regarding the attachment of an anti-blocking agent to the thermo-expansive microcapsules.

33. The disclosure of Nakajima is discussed earlier in this Office Action.

34. Masuda '604 and Nakajima are both directed towards the field of expandable resins/microcapsules. The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the thermo-expansive microcapsules of Masuda '604 by attaching colloidal calcium carbonate, as taught by Nakajima, for the purpose of obtaining the improved handling properties discussed above.

***Allowable Subject Matter***

35. Claim 1 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

36. The following is a statement of reasons for the indication of allowable subject matter: Independent claim 1 recites a method of producing heat-expanded microspheres, wherein said method comprises the steps of

providing a plurality of heat-expandable microspheres, each heat-expandable microsphere comprising a shell of thermoplastic resin, and a blowing agent encapsulated therein having a boiling point not higher than the softening point of the thermoplastic resin, and the plurality of heat-expandable microsphere having an average particle size from 1 to 100  $\mu\text{m}$ ;

feeding a gas fluid containing the plurality of heat-expandable microspheres through a gas-introducing tube having a dispersion nozzle on its an outlet thereof and fixed inside a hot gas flow, and then jetting the gas flow from the dispersion nozzle, wherein each of the heat-expandable microspheres comprises a shell of thermoplastic resin, and a blowing agent encapsulated therein having a boiling point not higher than the softening point of the thermoplastic resin, and have an average particle size from 1 to 100  $\mu\text{m}$ .

colliding the gas fluid with a collision plate fixed on a lower portion of the dispersion nozzle the gas fluid with a collision plate fixed on a downstream portion of the dispersion nozzle in order to disperse the plurality of heat-expandable microspheres in the hot gas flow; and

heating the plurality of dispersed heat-expandable microspheres in the hot gas flow at a temperature not lower than their the expansion initiating temperature of the plurality of heat-expandable microspheres, and thus expanding the same heat-expandable microspheres.

37. The closest prior art of record is Edgren et al, US4397799, which discloses a method of drying and expanding microspheres. A dispersion of microspheres in an inert liquid is atomized, then passed through a tube into a chamber containing a heated gas flow (see Figure 1). The microspheres are expanded within the heated gas. The prior art does not teach nor does it fairly suggest the claimed combination of elements of a gas-introducing tube having a dispersion nozzle fixed inside a hot gas flow, a collision

plate fixed on a downstream portion of the dispersion nozzle, and colliding the gas fluid with said collision plate.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey Lenihan whose telephone number is (571)270-5452. The examiner can normally be reached on Monday through Thursday from 7:30-5:00 PM, and on alternate Fridays from 7:30-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James J. Seidleck can be reached on 571-272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/595,910

Page 14

Art Unit: 1796

/JL/